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WATER DEVELOPMENT

Generally speaking, existing water supplies are adequate throughout the basin for at least the next couple of decades. Throughout Cache County, the water supply should take them well into the 2040s, while Box Elder County's present supply should meet the county needs through 2025. However, these projections are based upon a countywide condition for average water years and average yearly demand. On a micro scale and during drought conditions, some systems are hard pressed even now to provide adequate flows during periods of peak demand. Consequently, many local water providers are continually investigating additional water development options.

As growth takes place over the next couple of decades, local water suppliers will continue to develop available water sources. In Cache County, this will mean additional ground water development by existing municipal water purveyors. In Box Elder County, where ground water supplies are not so abundant, local water purveyors (primarily Bear River Water Conservancy District) will probably

have to be a bit more creative in providing for future water needs. To hold costs down, the Bear River Water Conservancy District and other Box Elder County water providers will likely continue to acquire existing high quality ground water rights through the willing buyer/willing seller process and develop whatever additional ground water along the east side of the county that might be available.

BEAR RIVER DEVELOPMENT PROJECT

Development of the Bear River has been studied for many years. In the 1950s, the Bureau of Reclamation identified and studied several potential reservoir sites on the lower Bear River and its tributaries. During the high precipitation and runoff years of the early 1980s, the Utah State Legislature directed the Utah Division of Water Resources to investigate controlling the level of the Great Salt Lake through storage and diversion of water from the Bear River.

In 1991 the Legislature passed the Bear River Development Act. The Act directs the Division of Water Resources to develop 220,000 acre-feet of the Board of Water Resources water rights in the Bear River and its tributaries, and allocated the water as follows: 50,000 acre-feet each to Jordan Valley Water Conservancy District and Weber Basin Water Conservancy District; 60,000 acre-feet to Bear River Water Conservancy District, and 60,000 acre-feet to water users in Cache County. The division is to plan, construct, own, and operate reservoirs and facilities on the river as authorized and funded by the Legislature and to contract the



Hyrum Reservoir

developed water to these four entities as specified in the Act.

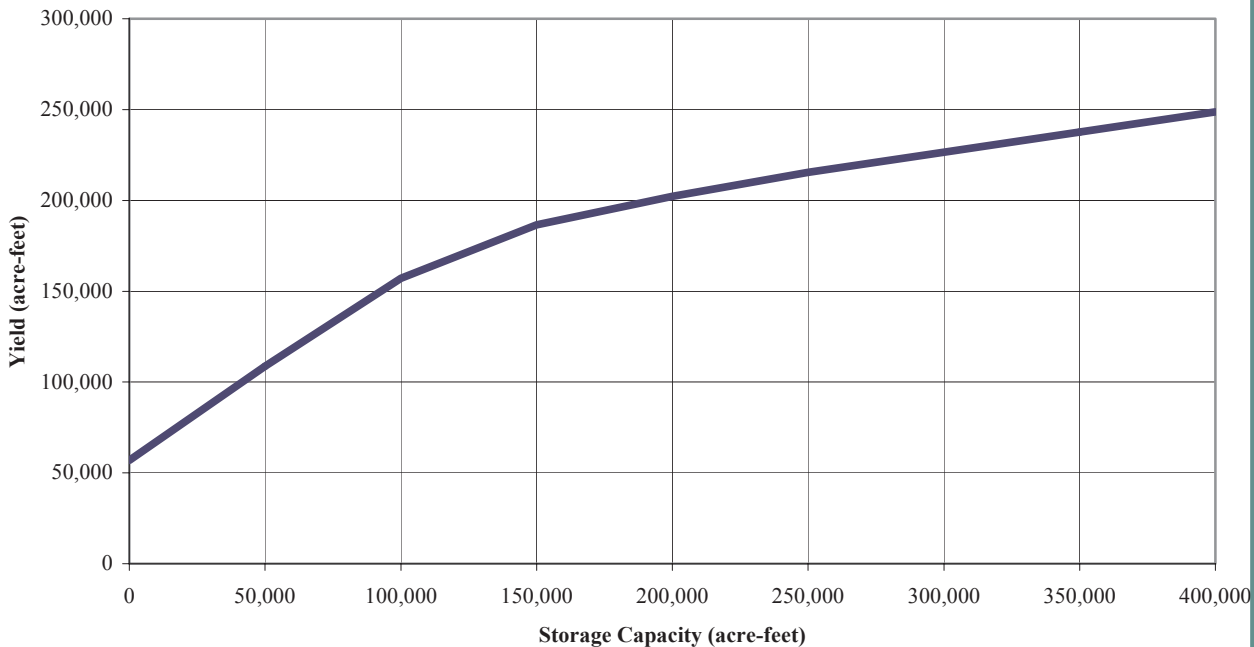
Based on revised estimates of water needs, public input, and cost analysis, the Utah Board and Division of Water Resources' current plan for Bear River development is as follows: (1) develop an agreement with the Weber Basin Water Conservancy District to store surplus Bear River Water in Willard Bay, (2) connect the Bear River with a pipeline and/or canal to Willard Bay from a point near the Interstate 15 crossing of the Bear River near Elwood in Box Elder County, (3) construct conveyance and treatment facilities to deliver water from Willard Bay to the Wasatch Front, and (4) build a dam in the Bear River Basin as the demand for additional water continues to increase.

Parts 1 through 3 would be timed to deliver water to the Wasatch Front within the next two decades (based on contracts with Jordan Valley Water Conservancy District and Weber Basin Water Conservancy District and legislative approval). In all likelihood, part 4, the construction of a reservoir in the Bear River Basin, would not be carried out

until the Bear River Water Conservancy District and/or Cache County water users need additional water.

The division estimates there are approximately 250,000 acre-feet of Bear River water that can be developed. Just how much water is actually developed will be a function of many factors. Without a doubt, the deciding factor will be how much reservoir storage is built. Other factors include: where the storage is located, what the demand pattern is like, and whether or not any water will be stored in Willard Bay. Figure 14 shows the relationship between the developable Bear River yield and the reservoir storage needed. The assumptions made in developing this figure are: Willard Bay is used to store flows from the Bear River, and a delivery reliability of 90 percent (a full supply in nine years out of ten) is acceptable. The graph shows that about 60,000 acre-feet of water can be developed from the Bear River without any new reservoir storage if water can be stored in Willard Bay. The next 100,000 acre-feet of developed water will require the construction of storage capacity at a 1-to-1 ratio (or 100,000 acre-feet of storage yields

Figure 14
Developable Bear River Yield vs Storage Capacity
(assuming use of Willard Bay and 90% reliable supply)



100,000 acre-feet of water). The next 50,000 acre-feet of storage will yield 25,000 acre-feet of water. After that, every 1,000 acre-feet of yield will require 4,000 acre-feet of storage. Consequently, to develop 250,000 acre-feet of water will require about 400,000 acre-feet of storage (about the equivalent of Jordanelle Reservoir).

In the 1991 Bear River Development Act, the Utah Legislature specifically directed the Division of Water Resources to investigate the Honeyville and Barrens reservoir sites. With growing concern about the possible environmental and social impacts at those two sites, the 2002 Legislature rescinded the directive to consider the Honeyville and Barrens sites and added a directive for the division to investigate the Washakie Site.

Washakie Reservoir

The Washakie Reservoir site is located just south of the Utah-Idaho state line between the I-15 freeway and the Union Pacific Railroad line. The reservoir is an off-stream site and would be contained on the north, west and south sides by a long dike. Originally investigated by the division in 1983, the site was not as economically favorable as several other sites in the basin. Now, however, with fewer impacts upon the environment, the site is considered by many to be the most favorable in the basin. The size of the reservoir would be

determined by the height of the dike. To date the maximum capacity the division has investigated is 185,000 acre-feet. Through exchanges upstream water users could enjoy the storage benefits of Washakie.

WEATHER MODIFICATION

Over the years, local sponsors and the Utah Division of Water Resources have been involved with numerous cloud seeding programs designed to increase the winter precipitation within different areas of the state. This is done on a cost-sharing basis with the local sponsors. Local sponsors initiate the project and apply to the division for funding assistance as part of the state's cloud seeding project. Nationally, studies indicate winter seeding projects generally increase the winter precipitation by 14 to 20 percent. Economic analysis of this sort of increase in precipitation shows the benefits from the extra water far outweigh the operational costs of seeding.

Cloud seeding in the East Box Elder/Cache County Project area is sponsored by the Bear River Water Conservancy District and Cache County. The East Box Elder/Cache County Project area has been in operation since 1989. Target and control regression analyses show a December-February precipitation average increase of 20 percent and an April 1 snow water content average increase of 18 percent. The net cost of the increased water is about \$1 per acre-foot.

With the cost being so reasonable, it makes sense to consider weather modification as a viable source of water development in the Bear River Basin. Existing cloud seeded areas of Wellsville Mountains, Bear River Range, and north-western Uinta Mountains account for only about six percent of the basin's total area. While these areas do represent the most mountainous portions of the basin, and hence the most productive areas for cloud seeding, there is



Washakie Reservoir Basin

still potential for cloud seeding in other areas of the basin.

The existing cloud seeding coverage of the eastern Uinta Mountains could be expanded to include the entire Bear River Basin watershed within the Uinta Mountains. This effort could be coordinated with interested parties in the Uintah Basin to include expansion of coverage into the upper Duchesne drainage as well.

The Thomas Fork and Smith's Fork area of Wyoming was cloud seeded as a test area in 1955 through 1970, 1980 through 1982, and 1989 through 1990. An evaluation of snow pack during those years indicated an increase in snow pack of 11 percent. Even though the topography of the test area is not as extreme as the Wellsville Mountains or the Bear River Range, the results were consistent with those realized elsewhere in the country. This is a strong indication that cloud seeding in these other areas of the basin would be just as successful as it has been elsewhere.

The cloud seeding of the Bear River Range could be expanded into Rich County to include the eastern slopes of this range. This area is the rain shadow side of the mountain, however, and may not yield as great an increase in snow pack as experienced on the western slope.

UPGRADING AND ENHANCING EXISTING INFRASTRUCTURE

M&I studies done by the division show that most drinking water systems in the basin have sufficient water to meet needs through at least 2020. Although they have sufficient water rights, many do not have the capacity or facilities to actually divert and deliver this water.

In a 1999 statewide survey of drinking water systems conducted by the Utah Division of Drinking Water, 91 percent of the respondents indicated the overall physical condition of their system would need to be upgraded within the next 15 years; and 31 percent of the respondents indicated their present system was deficient, particularly with respect to its ability to maintain minimum fire flows¹. There is good reason to believe that within the Bear River Basin the percentage of systems in need of upgrades or system enhancements is similar to the statewide numbers. Indeed, data submitted by the basin's water purveyors, and published in the Municipal and Industrial Water Supply Studies for the Bear River Basin² indicate many systems within the basin have an adequate water supply but suffer some limitation to the system's reliable capacity. Solutions to these problems include: developing additional water sources, deepening a well or increasing a pump size, replacing existing piping with new and enlarged piping, or adding more reservoir storage.

NOTES

1. Utah Division of Drinking Water, 1999 Survey of Community Drinking Water Systems, (Salt Lake City: Department of Environmental Quality, 2000), Appendix 11, 1 and 2. An annual survey prepared in cooperation with the Division of Water Rights and the Division of Water Resources.

2. Municipal and Industrial Water Supply Studies: Utah Bear River Basin, Utah Department of Natural Resources, Division of Water Resources, April, 2001